CLAIMS

1. A transducer microsystem, being defined as a transducer system in which the size of any active transducer components is in the order of centimetres or less, said transducer microsystem comprising

a main structural member; and

a number of components (22, 26) of an electromechanical transducer, physically attached to said main structural member, whereby electromechanical transducer being defined as at least one of the following;

an actuator, transforming an electrical signal into a mechanical motion; and

a sensor, transforming a mechanical motion into an electrical signal,

said transducer microsystem being **characterised in that**

said main structural member is a flexible printed circuit board (10); and

said flexible printed circuit board (10) comprises electrical connections (12) to said components (22, 26) of said electromechanical transducer.

2. The transducer microsystem according to claim 1, **characterised in that** said components (22, 26) of said electromechanical transducer are components of sensors and/or actuators operating by at least one physical effect selected from the list of:
piezoelectric,
electrostrictive, and
shape memory.

3. The transducer microsystem according to claim 1 ~~or 2~~, **characterised in that** said flexible printed circuit board (10) has an elastic deformation, whereby said flexible printed circuit board (10) forms a general support for internal (30, 32) and external forces.

Cont A1

4. The transducer microsystem according to claim 1, ~~2 or 3,~~ **characterised in that** said flexible printed circuit board (10) is elastically deformed to apply an elastic contact force (30, 32) to at least one of said components (22) of said electromechanical transducer, forming a mechanical contact.

5. The transducer microsystem according to any of the preceding claims, **characterised by** electrical components (24) and/or optical components attached to said flexible printed circuit board (10).

6. The transducer microsystem according to claim 5, **characterised in that** said flexible printed circuit board (10) is elastically deformed to apply an elastic contact force (30, 32) to at least one of said electrical or optical components (24), forming an electrical contact.

A2> 7. The transducer microsystem according to any of the claims 3 to 6, **characterised in that** said elastic deformation comprises an elastic compression or tension substantially perpendicular to the surface of said flexible printed circuit board (10).

8. The transducer microsystem according to claim 7, **characterised in that** said flexible printed circuit board (10) is arranged between a component (22) of said electromechanical transducer and at least one of the following objects:

a rigid support means (36),
an electrical or optical component (24), and
another of said components (22) of said electromechanical transducer,

whereby the intrinsic material elasticity of said flexible printed circuit board (10) provides an elastic contact force.

A3> 9. The transducer microsystem according to any of the claims 3 to 8, **characterised in that** said elastic deformation comprises an elastic deflection of at least a portion (19) of said flexible printed circuit board (10).

10. The transducer microsystem according to claim 9, **characterised in that** said elastic deflection is a bending or a folding.

A4 > 11. The transducer microsystem according to claim 9 or 10, **characterised in that** a first component (22) of said electromechanical transducer is positioned in the path of said elastic deflection, whereby the resilience of said deflected flexible printed circuit board portion (19) applies a spring force on said first component (22) of said electromechanical transducer.

12. The transducer microsystem according to any of the preceding claims, **characterised in that** said flexible printed circuit board (10) constitutes a casing of said transducer microsystem.

13. The transducer microsystem according to any of the preceding claims, **characterised in that** said flexible printed circuit board (10) comprises polyimide material.

14. The transducer microsystem according to any of the preceding claims, **characterised in that** said flexible printed circuit board (10) is provided with geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48), which are engagable to other ones of said geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48) and/or to other members of said transducer microsystem.

15. The transducer microsystem according to claim 14, **characterised in that** said geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48) comprises holes, slits, pits, ridges, valleys and/or bumps.

A5 > 16. The transducer microsystem according to claim 14 or 15, **characterised in that** said geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48) comprise adjustable locking structures.

Cont A5

17. A microelectromechanical motor, comprising a transducer microsystem according to any of the preceding claims.

18. A microelectromechanical motor according to claim 17, **characterised in that** said microelectromechanical motor operates according to one of the following motion principles:

inertia based,

resonant effect or

non-resonant repetition of small steps.

19. A method of assembling a transducer microsystem, whereby transducer microsystem being defined as a transducer system in which the size of any active transducer components is in the order of centimetres or less, said assembling method comprising the steps of:

providing a main structural member;

physically attaching a number of components (22, 26) of an electromechanical transducer to said main structural member, whereby electromechanical transducer being defined as at least one of the following;

an actuator, transforming an electrical signal into a mechanical motion; and

a sensor, transforming a mechanical motion into an electrical signal,

said assembling method being **characterised by** the steps of:

using a flexible printed circuit board (10) as said main structural member; and

electrically connect said components (22, 26) of said electromechanical transducer to said flexible printed circuit board (10).

20. The method of assembling a transducer microsystem according to claim 19, **characterised by** the further step of applying an elastic force to at least one of said components (22) of said electromechanical transducer by reshaping at least a portion of said flexible printed circuit board (10).

A6 > 21. The method of assembling a transducer microsystem according to claim 19 or 20, **characterised by** the further step of attaching electrical components (24) and/or optical components to said flexible printed circuit board (10).

22. The method of assembling a transducer microsystem according to claim 19, 20 or 21, **characterised in that** at least the major part of any steps of attaching components (22, 24, 26) to said flexible printed circuit are performed on a substantially flat flexible printed circuit board (10).

23. The method of assembling a transducer microsystem according to any of the claims 19 to 22, **characterised by** the further step of providing said flexible printed circuit board (10) with geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48), which are engagable to other ones of said geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48) and/or to other members of said transducer microsystem.

24. The method of assembling a transducer microsystem according to claim 23, **characterised by** the further step of locking said flexible printed circuit board (10) by said geometrical structures (16, 18, 20; 32, 33, 34; 40, 42; 44, 46, 48) to apply an elastic force to at least a first of said components (22) of said electromechanical transducer.

25. The method of assembling a transducer microsystem according to claim 24, **characterised by** adjusting said flexible printed circuit board (10) locking to apply an elastic force to compensate for thermal and/or dimensional variations and/or to adjust mechanical resonances of said first component (22) of said electromechanical transducer and/or to adjust the position of said first component (22) of said electromechanical transducer.

A7. 26. The method of assembling a transducer microsystem according to any of the claims 20 to 25, **characterised in that** said step of reshaping comprises at least one of the following steps;

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A 2

elastically folding said flexible printed circuit (10);

elastically bending said flexible printed circuit (10); and

elastically tensing or compressing said flexible printed circuit (10) substantially perpendicular to its surface.

27. The method of assembling a transducer microsystem according to claim 26, **characterised by** the step of positioning a component (22) of said electromechanical transducer in the path of said elastic reshaping, whereby the resilience of said reshaped flexible printed circuit board portion (19) applies a spring force on said electromechanical transducer component (22).

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